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either by automatic devices or otherwise, as fast as they are made, and the mill and machinery kept perfectly clean, there is little danger that fine dust will accumulate in out-of-the-way corners, or anywhere, to furnish the means of kindling at some unlucky moment a fire which can never be accounted for. And this is the only way in which dust explosions can be guarded against. It is almost impossible to prevent the use of exposed lights in mills in some shape or other, and if dust is lying about where it ought not to be —and it surely ought not to be in any well-conducted cabinet-shop—it is almost certain to be some time or other stirred up under circumstances which are extremely favorable for its explosion.

It is not many years since the professional architect thought it beneath his dignity to design cabinet-work, or pay attention to decorative painting. Now, however, some of the best minds in the profession can be engaged in designing new furniture, and the departure has neither lowered the dignity of the profession nor the artistic character of the work. Indeed, we are inclined to think that houses of any pretension, built under the supervision or from the plans of an architect, should have all the furniture required for its complete equipment designed and executed under the eye of the same architect. We have sufficient faith in the abilities of our architects to believe that, if this system was adopted, our houses would be more consistently furnished, and the manufacturers would be benefited by getting orders for a more substantial and better class of work.

Parties desiring back numbers of the Wood-Worker can get them in single numbers by addressing this office and enclosing the price. Those wanting the first six numbers can have them, bound in limp covers, with a gold title on the cloth cover, by remitting sixty cents to the publisher.

"Hints on Estimating," a little pamphlet of thirty-two pages, has been published in this office. It is an excellent work for builders. We send it to any address in Canada or the United States for six cents.

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Lessons in Projection.

By Robert Riddell, Teacher of the Artisan Class in the High School, Philadelphia, Pa.

One of the most difficult problems in carpentry to thoroughly understand is that of inclined framing. To find the shoulder and other cuts of each particular piece has long taxed the ingenuity of our best workmen, and many attempts to render the discovery of these lines less complicated have been made, but in most cases the results have not been satisfactory. Now, however, for the first time, I offer a perfectly reliable method for the finding of these lines, and one which may be easily tested and as easily understood if the following directions are closely followed :

Let us suppose the plan to be a right-angled figure, having sides which incline or flare equally to any desired angle. A corner post is also used which will incline same as ends and sides. The junction at the angles may either be formed by mitreing or by butt joints.

To describe the problem, begin by drawing two parallel lines, A B, and D C, Plate 54, any reasonable distance apart. Assume A N as inclination or flare of sides. From N square down a line making N A and N R equal. From A square down a line cutting D, join R D and in the angles thus formed find bevel 2 for cut in face of sides.

To find the bevel for mitre on edge of stuff, take N as a centre and describe an arc, touching the line A B and terminating at J. From R draw a line through J indefinitely. This gives bevel 3 for the mitre.

To find the corner post, proceed as follows: Make N C equal N D, join R C, and extend A N to cut R C at P, from which square up a line cutting at B. From N draw through B, thus forming both angles of the corner post, and giving bevel 4, which answers for either a butt joint, or the shoulder cuts on cross rails of framing.

Nothing can be more simple or more accurate than this method, and, as already mentioned, its correctness may be easily tested by first drawing the "spread-out," as shown on the upper portion of the Plate, on card-board, and cutting through on the lines marked x x x x ; then fold on the lines marked o o o. Bring the points S and S together, and the mode of construction will readily be understood.

The flare may be any angle ; the result will always be the same.

We shall next proceed to show the construction when the sides are to flare and make different angles. This problem is frequently required in carriage and other work.

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Isometric Projection.

In Fig. 8, Plate 31 (April number), we give at *a* the plan of top, at *b* the side, and at *c* the end elevation of a box, all of which are comprised in one isometrical drawing, as in Fig. 3, the mode of construction of which we now explain. Draw a right-hand isometrical line *a b*, Fig. 3, making it equal to the line *e d* in Fig. 8; next draw the left-hand isometrical line *a c*, Fig. 3, equal to the line *f g* in

Fig. 8. From the points *b c*, Fig. 3, draw isometrical lines, meeting in the point *d; a c d b* will be the isometrical projection of outline of top of box shown in plan *a*, Fig. 6. From *a c* and *b* draw perpendicular lines *c f*, *a e*, *b g*, and make them equal to the line *c d*, Fig. 8. From the point *e*, Fig. 3, draw isometrical lines to the points *f* and *g*. The rectangle *c f e a*, Fig. 3, is the isometrical projection of the outline of side of the box *b* in Fig. 8; and the rectangle *a e g b*, Fig. 3, of the end *c*, Fig. 8. The thickness of the sides is shown by taking from the plan *a*, Fig 8, the thickness, and setting it off from the points *b a c*, and *d*, to *k k i* and *b;* and from these points drawing isometrical lines, which, intersecting, form an inner rectangle, as shown in Fig. 3. The method of filling in the notches on the sides, Fig. 9, which, for convenience, is shown to a scale twice the size of that in Fig. 3. To put in the notches at the sides of the box in Fig. 3, draw, as in Fig. 9, two lines, *a c*, *b d*, representing the edge of the box. From *a*, Fig. 8, take the distance *d i*, and set it off from the point *a*, Fig. 9, to the point *e;* set off the distance *j i*, Fig. 8, from *e* to *f*, Fig. 9. From *e* and *f*, Fig. 9, draw isometrical lines to *h* and *g*. From *h*, *e*, and *f*, draw perpendicular lines, equal to the distance *k l*, in *b*, Fig. 8, *h i*, *e j*, and *f k*.

Proceeding to other examples, we give in Fig. 10, at *a*, the plan, *b* the section of a cut-stone, and at *c* an isometrical view of it. In drawing this proceed as in Fig. 11, which, for convenience, is shown of double the size. Draw two isometrical lines *a b*, *a c*, Fig. 11, and make *a b*, *a c*, equal to *d e*, *d f*, Fig. 10; draw the perpendiculars, *c f*, *a d*, Fig. 11, and make them equal to the depth of end *g*, Fig. 10. Join *d f*, *d e*, and from *f* and *e* draw lines cutting at *g*. From *f*, Fig. 10, measure to *h*, and set off this distance from *g* to *h*, Fig. 11, draw *h i*, and finish as shown.

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Practical Carpentry.

COVERING OF SOLIDS.

On Plate 55 we show how the development of surfaces is generated by a straight line moving parallel to itself. An inspection of the figures will be sufficient to explain the process. These figures contain some of the forms of development that occur in practice, as applicable to the sofits of arches in doors, windows, reverses, and passages. In all these diagrams, the point E is in the middle of the arc which forms the end of the arch. A *e* on the straight line is the developement, if A E, *e d* is equal to *e* D, and *e p* is equal to E P, *e f* is equal to *e* F. Where there is not sufficient room for the plan and sections of the solid and development of its surface in one diagram, Figs. 5, 6, and 7 show how they may be separated.

Next month we will give practical illustrations on the covering of solids in sufficient number to cover any exigency that may ever occur in the practice of any ordinary builder, and after that we will enter into the discussion of matters that the workman meets with in his every-day occupation.

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The Sectorian System of Hand-Railing.

SEVENTH PAPER.

Plate 50.

On this plate are shown the horse-pieces of stair, Plate 42, Sec. 2.

Fig. 1 is the first piece, and runs up to the first angle at A.

Fig. 2 commences at A, and extends to the next angle at B.

Fig. 3 commences at B, and extends to the floor landing at C.

Fig. 4 is the first cross-piece in rear of cylinder.

Fig. 5 is the second cross-piece, and constitutes all the full-length pieces. All the others, as marked on Plate 42, from one to eight, are *fillers*, and should be well filled, as the lower and upper pieces depend, in part, on them for support. All the bevels for cutting the riser lines can be obtained on plan—Plate 42, Sec. 2.

Section 2 is a continuation of Plate 42 and Section 1 of 50, Fig. 1, showing the plan, Plate 42, with tangents drawn as at a, b and c: a, being the centre line, has all to do with the sector.

Fig. 2 is the stretch-out of winders in the wreath, with two lower flyers, and one above the cylinder. The rail shows the easements, which must be obtained in the usual way, with the falling moulds. It will be seen that the falling moulds are straight with the exception of a slight curve at the end. After the convex and concave slabs are removed from the wreath-pieces, thus giving the outer and inner twist, the application of the falling mould, as laid down, will find plenty of wood for its use in giving shape to the rail. Of course it is understood that kerfing is the mode for the top and bottom twist.

Fig 3 is the quadrant wreath-piece for Fig. 1, the end sections showing the direction given to spring and plumb bevels. The same mould will answer for both pieces by reversing the same.

It will be seen by the plates presented, that all lines calculated to confuse have been dispensed with; while everything, it is thought, has been introduced to make the work plain to the comprehension of any one of ordinary capacity.

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Send six cents for " Hints on Estimating."